

## WEST AFRICA REGIONAL WATER FORUM (FREA0) 1<sup>ST</sup> EDITION

“Harnessing Water to Transform West Africa”

### Thematic Group 1: Water-Energy-Food-Environment Nexus (WEFE) in West Africa

## Thematic Report

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## Executive Summary

West Africa is endowed with abundant water resources, significant renewable energy potential, extensive agricultural systems, and valuable ecosystems. Despite this natural wealth, the region continues to face persistent challenges related to water security, energy access, food insecurity, environmental degradation, and climate vulnerability. Rapid population growth, accelerating urbanization, climate variability, and rising demand across sectors are placing increasing pressure on already interconnected and fragile resource systems.

This Diagnostic Report on the Water–Energy–Food–Environment (WEFE) Nexus in West Africa, prepared for the 1st edition of the West Africa Regional Water Forum (FREA0), assesses the current state of WEFE governance, policies, investments, and initiatives in West Africa. Drawing on regional data, policy analysis, and institutional reviews, the report examines how water, energy, food, and environmental systems interact, identifies where misalignments constrain development outcomes, and highlights pathways to operationalize integrated approaches.

### Key Findings

The analysis demonstrates that West Africa’s principal constraint is not the scarcity of water, energy, or land resources, but fragmented governance frameworks, weak coordination across sectors, and underinvestment in integrated solutions. Sectoral policies, planning instruments, and investment programs in water, energy, agriculture, and environment remain insufficiently aligned, leading to inefficiencies, unmanaged trade-offs, and missed opportunities for synergy. While regional coordination mechanisms and policy frameworks are well established, they have not yet been fully operationalized to enable coherent WEFE implementation on the ground.

Climate change acts as a critical risk multiplier. Rising temperatures, increasing rainfall variability, and more frequent flood events are undermining agricultural productivity, damaging infrastructure, and exacerbating food and livelihood insecurity. Hydropower and renewable energy potentials remain underutilized, rural electrification rates are extremely low, post-harvest losses persist, and climate and hydrometeorological information systems remain insufficiently developed to support evidence-based decision-making.

At the same time, the report identifies a clear window of opportunity. Ongoing revisions of key regional policies in water, agriculture, and energy provide an entry point to embed WEFE principles into planning frameworks. Emerging regional financing instruments and partnerships with development finance institutions, combined with growing access to climate finance, offer new pathways to support integrated investments. Proven WEFE solutions—including solar-powered irrigation, renewable-energy-based agro-processing, agrivoltaic systems, circular economy approaches, and digital climate and decision-support tools—are already delivering multi-sector benefits when embedded within appropriate governance, financial, and sustainability frameworks.

### Strategic Recommendations

Based on the diagnostic, the report proposes prioritized and actionable recommendations structured around four pillars:

**Policies and Governance:** Federate and strengthen existing regional coordination mechanisms across ECOWAS, WAEMU, and CILSS to promote policy coherence and structured intersectoral trade-off management under a WEFE Nexus framework.

**Financing and Investment:** Dedicate WEFE Nexus financing windows within existing regional funds (EBID, ECOWAS Transport and Energy Fund, etc...) to derisk and cofinance projects that deliver measurable benefits across water, energy, and food security.

**Capacity Building and Knowledge Management:** Accelerate and strengthen the implementation of the ECOWAS Hydromet Initiative, in order to deliver reliable climate, water, and weather services that can effectively underpin WEFE-informed planning and decision-making.

**Research and Technology Innovation:** Orient applied research toward demand-driven, operational WEFE solutions co-developed by research institutions, innovation hubs, and public decision-makers.

### **Perspectives for FREA0**

The report positions FREA0 as a pivotal platform to move from diagnosis to implementation. By providing political endorsement, strengthening cross-sector dialogue, aligning regional institutions and financing instruments, and supporting the development of bankable and inclusive WEFE project pipelines, FREA0 can help anchor the WEFE Nexus as an operational framework for regional integration, climate resilience, and inclusive economic growth. Ultimately, the WEFE Nexus represents not only a technical approach to resource management, but a strategic pathway for translating West Africa's natural capital into sustainable development outcomes.

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## List of Acronyms and Abbreviations

| Acronym  | Meaning                                                                    |
|----------|----------------------------------------------------------------------------|
| CILSS    | Permanent Interstate Committee for Drought Control in the Sahel            |
| EBID     | ECOWAS Bank for Investment and Development                                 |
| ECOWAP   | ECOWAS Agricultural Policy                                                 |
| ECOWARN  | ECOWAS Early Warning and Response Network                                  |
| ECOWAS   | Economic Community of West African States                                  |
| ECREEE   | ECOWAS Centre for Renewable Energy and Energy Efficiency                   |
| EREEEF   | ECOWAS Renewable Energy and Energy Efficiency Facility                     |
| FAO      | Food and Agriculture Organization of the United Nations                    |
| FREAO    | West Africa Regional Water Forum                                           |
| GEF      | Global Environment Facility                                                |
| GW       | Gigawatt                                                                   |
| GWP-WA   | Global Water Partnership–West Africa                                       |
| IGRAC    | International Groundwater Resources Assessment Centre                      |
| IUCN     | International Union for Conservation of Nature                             |
| IWMI     | International Water Management Institute                                   |
| IWRM     | Integrated Water Resources Management                                      |
| MRU      | Mano River Union                                                           |
| MW       | Megawatt                                                                   |
| NBA      | Niger Basin Authority                                                      |
| OMVS     | Senegal River Basin Development Organization                               |
| OMVG     | Gambia River Basin Development Organization                                |
| PFCM     | Permanent Framework for Coordination and Monitoring of IWRM in West Africa |
| RAAF     | Regional Agency for Agriculture and Food                                   |
| REAP     | ECOWAS Regional Electricity Access Project                                 |
| ReWARD   | Restoring Ecosystems for Water and Development (Volta Basin Project)       |
| RIWEMono | Regional Initiative for Water and Environment in the Mono River Basin      |
| SRCC     | Sub-Regional Consultative Council on IWRM                                  |
| TCE      | Technical Committee of Experts (of the PFCM)                               |
| TDA-SAP  | Transboundary Diagnostic Analysis- Strategic Action Plan                   |
| WAEMU    | West African Economic and Monetary Union                                   |
| UN       | United Nations                                                             |
| UNEP-DHI | United Nations Environment Programme–DHI Centre for Water and Environment  |
| USD      | United States Dollar                                                       |
| VBA      | Volta Basin Authority                                                      |
| WAPP     | West African Power Pool                                                    |
| WASCAL   | West African Science Service Centre on Climate Change and Adapted Land Use |
| WAWRP    | West African Water Resources Policy                                        |
| WEFE     | Water-Energy-Food-Environment/Ecosystem                                    |
| WMO      | World Meteorological Organisation                                          |
| WRMC     | Water Resources Management Centre (ECOWAS)                                 |

## 1. Introduction and Thematic Context

West Africa is at a critical juncture in its development trajectory. The region is endowed with abundant water resources, significant renewable energy potential, fertile agricultural lands, and rich ecosystems. Yet, despite this natural wealth, West African countries continue to face persistent challenges in water security, energy access, food production, and environmental sustainability. Rapid population growth, accelerated urbanization, climate variability, and structural weaknesses in infrastructure and governance are intensifying pressures on already fragile resource systems.

In response to these interlinked challenges, the Water–Energy–Food–Environment (WEFE) Nexus has emerged as a strategic framework for improving development outcomes through integrated, cross-sectoral planning and management. The Nexus approach recognizes that decisions taken in one sector inevitably produce impacts—positive or negative—across others, and that sustainable development can no longer be achieved through isolated, sector-by-sector interventions. In the West African context, where agriculture consumes the majority of freshwater, energy systems depend heavily on water availability, and ecosystem degradation amplifies climate risks, the Nexus is not a theoretical construct but an operational necessity.

This Diagnostic Report of THEMATIC GROUP 1 on the WEFE Nexus in West Africa has been prepared for the 1st Edition of the West Africa Regional Water Forum (FREA0) as a knowledge and dialogue-oriented tool to support regional policy reflection and decision-making. The report provides a comprehensive assessment of the current state of WEFE governance, policies, investments, and initiatives across West Africa. Its purpose is not only to take stock of existing efforts, but also to identify systemic constraints, untapped opportunities, and priority actions required to operationalize the Nexus at regional and national levels.

The analysis demonstrates that the region’s core challenge is not the scarcity of resources, but rather fragmented governance frameworks, insufficient coordination across sectors, underinvestment in integrated infrastructure, and limited use of climate and resource data in decision-making. At the same time, the report highlights promising developments, including ongoing policy revisions, emerging regional financing instruments, technological innovations at the WEFE nexus, and growing interest in climate finance and resilience-focused investments.

By synthesizing evidence from regional institutions, national programs, development partners, and research initiatives, this diagnostic aims to:

- clarify the strategic relevance of the WEFE Nexus for West Africa’s development agenda;
- inform ministerial and technical dialogue at FREA0;
- and support the formulation of coherent, actionable recommendations to guide future regional cooperation and investment.

Ultimately, this report positions the WEFE Nexus as a lever for regional integration, climate resilience, and inclusive growth, and FREA0 as a pivotal platform to translate analysis into political commitment and coordinated action.

### 1.1 Context and Justification of the Nexus Approach

#### 1.1.1 Demographic and Urban Dynamics

West Africa is one of the world's fastest growing demographic regions. As of 2025, the regional population stands at approximately 466.53 million, having grown by 10.28 million persons (2.25%) from the previous year [1]. Projections indicate that this growth trajectory will continue, with the population expected to exceed 700 million by 2050. This demographic expansion translates directly into escalating demand for water, energy, and food, compounding existing pressures on already strained resource systems.

Urbanization is accelerating these pressures. The urban population share has increased to approximately 72.42%, with major cities experiencing particularly rapid expansion [1]. Abidjan's population has reached an estimated 6.06 million, growing at 3.24% annually [1]. Ghana's population is projected to reach approximately 35 million by 2025, with 55% residing in urban areas [1]. Lagos (Nigeria) exceeds 20 million inhabitants and is one of the fastest growing megacities globally [1].

Urban concentration generates intense localized demand for water, electricity, and food, often exceeding the capacity of existing infrastructure. In many cities, groundwater is increasingly exploited as a primary source, raising concerns about aquifer depletion and contamination. The IGRAC assessment of groundwater in fast growing West African cities highlights the critical need for sustainable management of this invisible resource [7]. Rapid urban growth has also outpaced the expansion of urban sanitation infrastructure across West Africa. In many cities, sewer networks, wastewater treatment facilities, and fecal sludge management systems are insufficient or absent, particularly in informal and peri-urban settlements. As a result, untreated wastewater and solid waste are widely discharged into the environment, contaminating surface water and shallow aquifers, increasing public-health risks, and aggravating flood impacts during extreme rainfall events. These sanitation deficits impose rising costs on urban water supply systems, undermine labor productivity, and exacerbate environmental degradation, further intensifying the pressure on already strained urban water, energy, and food systems.

Rural areas, by contrast, suffer from acute deficits in basic services. Electricity access in rural areas stands at only 10% across the ECOWAS region [2], while access to safe drinking water and sanitation remains significantly lower than in urban centers. This rural urban disparity drives migration to cities, further concentrating demand and straining urban infrastructure.

### 1.1.2 Economic Development and Sectoral Priorities

West African economies are characterized by a structural duality: a dominant agricultural sector employing the majority of the workforce but contributing a modest share of GDP, alongside extractive industries (oil, gas, minerals) that generate substantial export revenues but provide limited employment. Economic growth objectives articulated in national development plans and ECOWAS Vision 2050 emphasize industrialization, value addition in agriculture, and energy sector expansion, all of which have direct and often competing implications for natural resources.

Agriculture remains the backbone of regional economies, employing millions and ensuring food security. ECOWAS agricultural interventions are guided by the ECOWAS Agricultural Policy (ECOWAP), which aims to modernize production, strengthen value chains, and promote inclusive agribusiness [9]. However, the region remains dependent on food imports to meet population needs, underscoring the imperative of local agro-industrial development.

Energy sector development is a declared priority. ECOWAS has invested \$36 billion in the West African Power Pool (WAPP) project, targeting the construction of 23,000 km of interconnection lines and generation of 16,000 MW between 2019 and 2033 [10]. Yet the installed production capacity of 25,140 MW remains dominated by thermal generation (76%), with hydroelectricity (22%) and solar/wind (2%) accounting for a smaller share; an unbalanced mix that exposes the energy system to fossil fuel price volatility and climate risks [8].

Intersectoral competition is most acute in water allocation. The same water resources are required for hydroelectric generation, irrigated agriculture, urban domestic supply, and industrial uses. Without coordinated planning, tradeoffs are made implicitly rather than through transparent, evidence-based prioritization. The Nexus approach offers a framework for making these tradeoffs explicit and for identifying efficiency gains that benefit multiple sectors simultaneously.

### 1.1.3 Vulnerabilities and Climate Impacts

Climate change is no longer a future scenario for West Africa. It is a present and accelerating reality. According to the World Meteorological Organisation's 2024 State of the Climate in Africa report, West Africa has experienced a 1.2°C temperature rise above preindustrial levels, and 2024 ranked among the five hottest years on record for the Sahel [4]. This warming trend is projected to continue, with global temperatures potentially reaching 1.5°C between 2030 and 2052 [14].

Climate impacts are unevenly distributed across the region. The Sahel and northern regions experience extended dry spells that disrupt planting cycles and water availability, while parts of the Gulf of Guinea receive above average rainfall [4]. This spatial heterogeneity complicates regional planning and requires differentiated adaptation strategies.

Flooding has emerged as a particularly severe threat. Data from the ECOWAS Early Warning and Response Network (ECOWARN) shows a 47% increase in flood related incidents between 2021 and 2024, affecting over 5 million people with damages exceeding \$1.3 billion [5]. Flooding in the region has direct consequences for agriculture and food security, destroying crops, eroding soils, and displacing rural populations [15].

Agricultural productivity is highly vulnerable to climate variability. A recent ECOWAS study handled by the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) found that climate related disruptions reduced regional agricultural productivity by up to 10% in 2024, contributing directly to food insecurity and inflationary pressures [6]. Localized shortfalls were observed in countries including Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, and Togo [6].

The hydrological cycle is undergoing significant alteration. Climate and land use/cover changes influence evapotranspiration, infiltration, surface runoff, groundwater flow, and stream discharge regimes. The future of irrigation in West Africa will be driven by these strong external factors (rapid population growth, climate change, and land use/cover change) requiring adaptive management strategies that account for increasing uncertainty [16].

### 1.1.4 Regional Integration and Cross-Border Cooperation

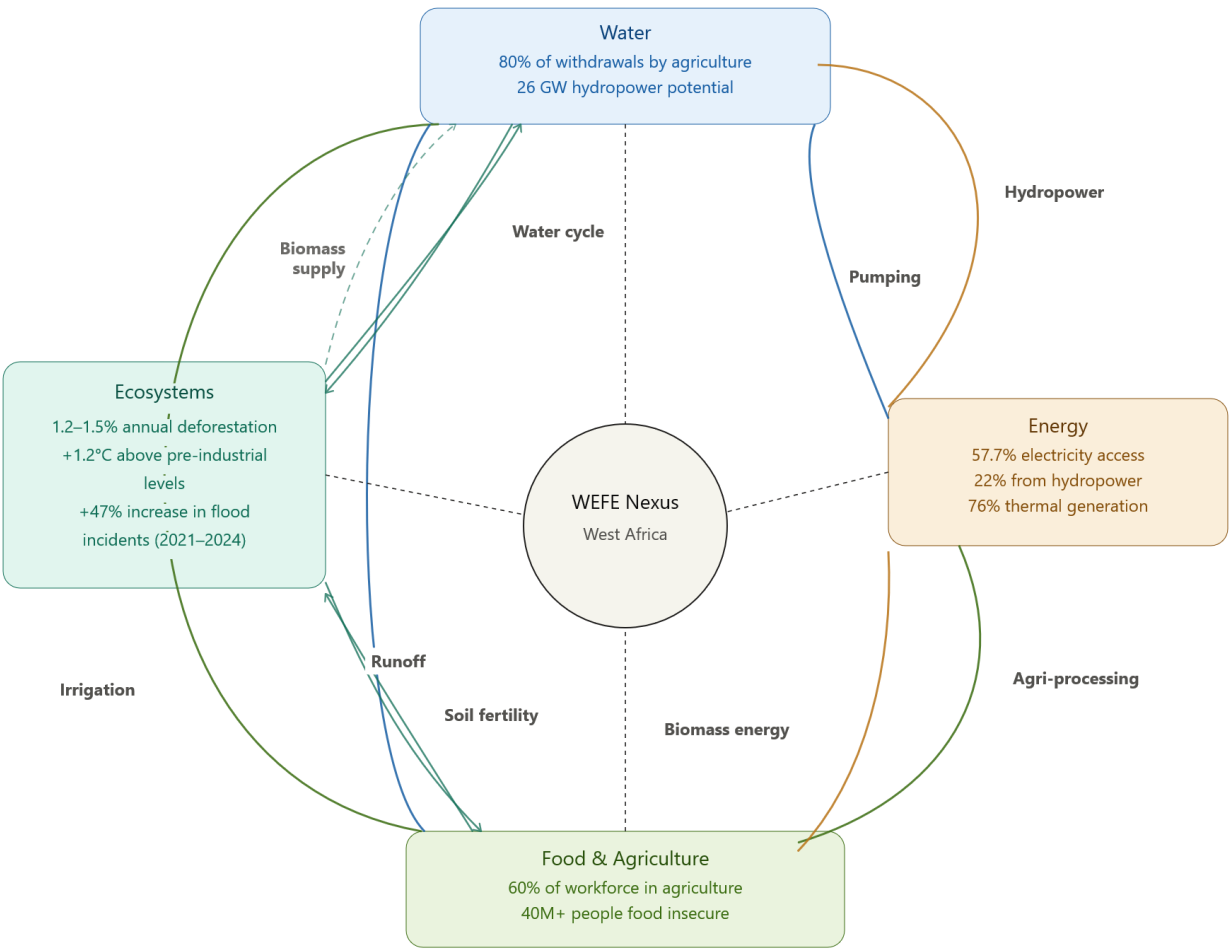
West Africa has one of the most advanced regional integration architectures on the African continent. ECOWAS, established in 1975, provides the overarching political and institutional framework, complemented by the West African Economic and Monetary Union (WAEMU) and specialized agencies. This institutional density creates both opportunities for coordinated action and challenges of overlapping mandates.

### 1.1.5 Importance of the WEF Nexus Approach

The traditional approach of managing water, energy, agriculture, and environment as separate sectors is no longer viable. Decisions made in one domain inevitably produce cascading impacts across others. Constructing a hydroelectric dam is not solely an energy decision; it is a water allocation decision with downstream consequences for irrigation, ecosystems, and community livelihoods. Expanding irrigated agriculture increases energy demand for pumping while competing with urban and industrial water uses. The Water Energy Food and Environment (WEFE) Nexus approach provides a framework for managing these interdependencies systematically. Unlike sectoral approaches, Nexus recognizes that energy security, food security, water security, and ecosystem health are inextricably linked. In the West African context, where hydropower accounts for 22% of installed electricity generation and agriculture consumes over 80% of freshwater withdrawals, the Nexus is not an academic abstraction, it is an operational necessity [8] [11].

A review of Water Energy Food (WEF) Nexus research across Africa identifies climate change, governance, and resource security as the dominant themes shaping Nexus scholarship and practice on the continent [12]. More recent systematic literature reviews confirm that Nexus research in Africa is evolving toward more

integrated, adaptive, and equitable frameworks, though significant gaps remain in operationalizing these concepts at the local level [13]. These academic insights underscore the need for context specific, evidence-based Nexus interventions tailored to West African realities.



**The Water-Energy-Food-Ecosystems (WEFE) Nexus in West Africa**

Sources: ECOWAS (2024; 2026); FAO (2024); WMO (2024); IFAD (2024)

### 1.2 Existing Political and Strategic Frameworks

The WEFE Nexus in West Africa operates within a dense policy landscape of regional and national frameworks. Understanding this architecture is essential for identifying coherence, gaps, and opportunities for Nexus integration.

#### Water Sector Frameworks

- West African Water Resources Policy (WAWRP):** Adopted in December 2008 by the ECOWAS Conference of Heads of State and Government [17], this policy represents a unique experience in developing a common sectoral policy for regional integration organizations. A revision of the WAWRP is currently underway [18].

- **Ouagadougou Declaration (1998):** Foundation for regional Integrated Water Resources Management (IWRM), guiding efforts for nearly three decades.
- **Regional Initiative for Development, Resilience and Valorization of Water Resources (DREVE):** An ambitious, innovative program led by ECOWAS and other West African regional integration organizations, notably WAEMU and CILSS, with financial support from the World Bank [18].
- **ECOWAS Hydromet Initiative (2021):** Assessment of meteorological and hydrological service capacities with investment needs estimated at \$324.5 million [19].

#### Energy Sector Frameworks:

- **ECOWAS Energy Policy:** Provides the overarching regional framework for sustainable energy development, focusing on energy security, regional integration, efficiency, and increased access to modern energy services across member states.
- **ECOWAS Renewable Energy and Energy Efficiency Policies (EREP & EEEP):** Regional frameworks promoting the large-scale deployment of renewable energy and improvements in energy efficiency, with targets to increase the share of renewables in the energy mix and reduce energy intensity across Member States [20].
- **ECOWAS Green Hydrogen Policy and Strategy Framework:** Targets 0.5 million tons annual green hydrogen production by 2030 and 10 million tons by 2050 [21].
- **ECOWAS revised master plan for the development of power generation and transmission of electrical energy (2019–2033):** Strategic framework for regional power generation and transmission, comprising 75 regional projects with a \$36 billion investment envelope [10].
- **Regional Electricity Market:** Established in 2018; 14 of the original 15 countries ratified participation. Market operations continue among current members and interconnected nonmembers [10].
- **ECOWAS Renewable Energy and Energy Efficiency Facility (EREEEF):** Mechanism for catalyzing sustainable energy investments.

#### Agriculture and Food Security Frameworks:

- **ECOWAS Agricultural Policy (ECOWAP):** Guiding framework for agricultural modernization, currently undergoing revision to optimize institutional arrangements and funding mechanisms [9].
- **Regional Food Security Reserve:** Established February 2013; maintains a stockpile of over 74,000 tons of food for emergency deployment.
- **West Africa Fertilizer and Soil Health initiatives:** Critical for improving productivity and restoring degraded lands.

#### Cross Cutting and Environmental Frameworks:

- **ECOWAS Environment Policy:** Regional framework aimed at promoting environmental sustainability, strengthening natural resource management, and supporting climate change adaptation and mitigation across Member States, with emphasis on ecosystem protection, pollution control, and sustainable development integration [22].
- **ECOWAS Environment Action Plan:** Operational instrument for implementing the Environment Policy, focusing on strengthening institutional capacities, improving environmental monitoring systems, and supporting coordinated regional responses to environmental degradation and climate risks [23].
- **ECOWAS Convergence Plan for the Sustainable Management and Use of Forest Ecosystems:** Framework for addressing forest cover loss, biodiversity decline, and transboundary challenges.
- **ECOWAS Vision 2050 and African Union Agenda 2063:** Overarching development visions providing strategic direction.

- **ECOWAS Cross Border Cooperation Support Programme (2023–2027):** Multisectoral development program working with border communities on social cohesion and sustainable development.
- **Common Environmental Improvement Policy (PCAE) of the WAEMU:** formally adopted by the Heads of State and Government through Additional Act No. 01/2008/CCEG/UEMOA of January 17, 2008, to establish a common regional framework within the WAEMU to ensure the protection, preservation, and sustainable management of the environment, while supporting economic growth, social development, and poverty reduction in Member States.
- **Strategic Framework for Agricultural Water in the Sahel (2017):** Regional reference document developed under the coordination of the CILSS, with the support of ECOWAS and WAEMU. It was adopted in September 2017 by the Sahelian countries following the commitments made under the 2013 Dakar Declaration on Irrigation and serves as a shared vision and strategic guide for the development of agricultural water management and irrigation across the Sahel.

The governance architecture includes the ECOWAS Commission, WAEMU, CILSS, basin organizations (NBA, VBA), and specialized agencies such as WRMC, ECREEE, WAPP, and RAAF. The primary coordination mechanism is the PFCM/IWRM-WA, which provides a multi-level governance structure comprising the MMC, TCE, SRCC, and WRMC. However, the PFCM has faced significant institutional inertia, with no statutory meetings held between 2015 and 2024. This stagnation is now being addressed: the 11<sup>th</sup> TCE and 5<sup>th</sup> MMC sessions met in Abuja in June 2024 [18], and the 12<sup>th</sup> TCE met in Dakar in July 2025 to advance the revitalization process [24].

Following the geopolitical reconfiguration of ECOWAS, the WRMC has been relocated to Guinea [25]. The WRMC has demonstrated renewed momentum by signing a five-year agreement with IWMI in May 2025 to enhance transboundary water governance [26] and partnering with IUCN to support the establishment of the Mano River Union's Cross-border River Basins Management Authority (CRBMA) [27].

While these frameworks individually address components of the Nexus, they are largely developed and implemented within sectoral silos. The absence of an overarching regional Nexus policy or coordination mechanism limits the ability to identify and manage intersectoral tradeoffs systematically.

ECOWAS has formally recognized the imperative of Nexus thinking during the Munich Security Conference (February 2025), where ECOWAS highlighted the WEF nexus as a conflict-prevention mechanism in fragile and climate-exposed zones of West Africa. The Commission has engaged international partners to "further harness the Water-Energy-Food Nexus as a tool for conflict prevention" [28]. Specialized agencies such as the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) have launched dedicated Nexus programs and signed agreements with initiatives like the Water and Energy for Food (WE4F) initiative to scale innovations that simultaneously enhance water efficiency, expand renewable energy use, and increase food production [29].

## 2. Overview of WEF Activities in the ECOWAS Region

Several activities addressing the nexus issue are being carried out in the region by regional and national institutions as well as by development partners.

| Implementation institution | Name of Project/Programme | Project Objectives | Countries Impacted | Project Period |
|----------------------------|---------------------------|--------------------|--------------------|----------------|
|----------------------------|---------------------------|--------------------|--------------------|----------------|

|                                |                                                                              |                                                                                                                                                   |                                     |            |
|--------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------|
| <b>AGRHYMET / AICCRA</b>       | Translating Seasonal Climate Forecasts into Actionable Information           | To build the capacity of national meteorological services to use crop and hydrological models for generating sector-specific climate information. | West Africa and Sahel               | 2021-2026  |
| <b>AGRHYMET / UNDP</b>         | Tripartite Partnership for Flood Forecasting                                 | To improve flood forecasting and early warning systems by combining scientific expertise, regional forecasting capacity, and knowledge brokerage. | West Africa and Sahel               | 2025-2029  |
| <b>RAAF</b>                    | Programme OFZ (Burkina Faso/Ghana)                                           | To construct solar-powered boreholes and develop irrigated perimeters for market gardening in onchocerciasis-free border zones.                   | Burkina Faso, Ghana                 | 2003 -2007 |
| <b>RAAF</b>                    | Projet maraîchers transfrontaliers (Togo/Bénin)                              | To support women's economic empowerment and local integration by establishing cross-border market gardening perimeters.                           | Togo, Benin                         | 2021- 2026 |
| <b>RAAF</b>                    | PMAI-AO (Alimentation scolaire intégrée)                                     | To strengthen local food systems and improve child nutrition by linking local agricultural production to school canteens.                         | 12 ECOWAS countries + AES Countries | 2023-2027  |
| <b>EGDC</b>                    | Programme d'appui aux femmes transformatrices                                | To support women processors of agricultural, fishery, and artisanal products by strengthening their access to energy, equipment, and markets.     | 12 ECOWAS countries + AES Countries | Since 2010 |
| <b>WRMC</b>                    | Projet Spécial : Amélioration de l'Accès à l'Eau                             | To improve access to drinking water in rural areas.                                                                                               |                                     | 2023-2026  |
| <b>CILSS</b>                   | P2-P2RS - Programme de renforcement de la résilience au Sahel                | To strengthen climate resilience and food security by constructing water infrastructure and restoring degraded lands.                             | Togo, Sahelian countries            | 2023- 2027 |
| <b>CILSS / AGRHYMET</b>        | FSRP - Food System Resilience Programme                                      | To provide climate, water, agriculture, and food security monitoring services, including digital advisory tools for crisis management.            | West Africa and Sahel               | 2022-2030  |
| <b>CILSS / AGRHYMET</b>        | Sudano-Sahelian Initiative for Regional Development, Jobs, and Food Security | To research the nexus of land degradation, climate change, and energy in the Sahel and identify integrated solutions.                             | Sahelian countries                  | Since 2021 |
| <b>CILSS / AGRHYMET / UNDP</b> | Regional Climate Security Programme (Western Sahel)                          | To construct and rehabilitate potable water points and implement conflict-sensitive early warning systems to reduce water-related tensions.       | Burkina Faso, Mali, Niger           | 2025-2030  |

|                       |                                                                                                                                       |                                                                                                                                                                                                                                                   |                                       |             |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------|
| <b>CORAF / RAAF</b>   | ABEE (West African Breeding Networks and Extension Empowerment)                                                                       | To contribute to a sustainable increase in agricultural productivity and food security by training breeders and disseminating climate-resilient dry cereal varieties.                                                                             | Burkina Faso, Niger, Senegal          | 2020 – 2024 |
| <b>ECREEE</b>         | Transition to a Clean Energy Circular Economy through the Optimization of High Energy Intensity Value Chains in High Impact Sectors   | To improve livelihoods for women and youth by introducing clean energy into agricultural value chains to reduce post-harvest losses and convert waste into productive energy.                                                                     | Benin, Niger, Nigeria, Senegal        | 2022-2027   |
| <b>ECREEE</b>         | Water and Energy for Increased Food Security and Socio-Economic Development, Promoting Clean Cooking Solutions and Solar Technologies | To increase food security by promoting solar PV for water pumping in agriculture, clean cooking solutions in schools and health facilities, and efficient fish smoking practices.                                                                 | Cabo Verde, Guinea Bissau, The Gambia | 2022-2027   |
| <b>ECREEE</b>         | FRSD Project - Promotion of the WE4F nexus (Water and Energy for Food) through capacity-building in ECOWAS communities                | To promote sustainable energy and climate-smart food systems through capacity building and green entrepreneurship training for women and youth.                                                                                                   | Benin, Guinea Bissau, Togo            | 2024-2025   |
| <b>ECREEE</b>         | Steering the Circular Economy through the Water-Energy-Food Nexus in West Africa – Phase 1                                            | To conduct a scoping exercise to establish a baseline for optimizing energy-intensive agricultural value chains, funded by ADA.                                                                                                                   | Côte d'Ivoire, Ghana, Liberia, Togo   | 2023- 2025  |
| <b>ECREEE / AU-EU</b> | ONEPlanET                                                                                                                             | To develop integrated WEF Nexus models and open-source tools for sustainable energy planning and climate resilience.                                                                                                                              | Multiple African countries            | 2022-2025   |
| <b>ECREEE</b>         | ECOWAS Energy Transition in Food Systems Facility (EETFS-Facility)                                                                    | To support the energy transition of agri-food systems in West Africa by promoting the large-scale deployment of renewable energy and energy efficiency solutions, while strengthening regional capacities and synergies with existing initiatives | 12 ECOWAS Member States               | 2026-2030   |
| <b>ECREEE/ EBID</b>   | ECOWAS Renewable Energy and Energy Efficiency Facility (EREEEF)                                                                       | The overall objective of EREEEF is to create a favorable investment and business environment that leads to accelerated deployment and use of RE and EE technologies and services in rural, peri-urban, and urban areas of West                    | 12 ECOWAS Member States               | Since 2027  |

|                                       |                                                                                                                                           |                                                                                                                                                                                                                                                         |                                                                                |             |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------|
|                                       |                                                                                                                                           | Africa including WEFE technologies.                                                                                                                                                                                                                     |                                                                                |             |
| <b>GIZ</b>                            | FREXUS / Nexus Regional Dialogue Projects                                                                                                 | To apply the WEF Nexus approach to improve climate security and resilience, including the development of a decision-making tool for infrastructure planning.                                                                                            | Niger Basin countries                                                          | 2019-2023   |
| <b>GIZ / WE4F</b>                     | Water and Energy for Food (WE4F) West Africa Hub                                                                                          | To scale up climate-friendly, water, and energy-efficient innovations by supporting SMEs in the agricultural sector.                                                                                                                                    | Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, Togo | 2021-2023   |
| <b>UNEP-DHI / VBA / GWP-WA / IUCN</b> | ReWARD (Restoring Ecosystems for Water and Development)                                                                                   | Strengthen transboundary water governance and ecosystem restoration; develop hydrological models and decision support tools for climate resilience.                                                                                                     | Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo                          | 2023 – 2028 |
| <b>UCN / MBA / OSS / GWP-WA</b>       | RIWE-Mono (Regional Initiative for Water and Environment in the Mono River Basin)                                                         | Strengthen IWRM and transboundary cooperation through TDA-SAP methodology and community-driven pilot initiatives.                                                                                                                                       | Benin, Togo                                                                    | 2025 – 2029 |
| <b>IWMI</b>                           | Scoping Study for Irrigation Water Management and WEFE Nexus Operational Roadmap and Gender Responsive Business/Finance Models In Nigeria | Understand current irrigation water management systems and constraints, Map WEFE linkages and develop an operational roadmap for the WEFE nexus in irrigation, and Identify viable and gender-responsive business/finance models for scaling solutions. | Nigeria                                                                        | 2026-2030   |

In addition to individual projects, ECOWAS has established a Specialized Inter-Agency Working Group on the Energy-Water-Food Nexus and Gender Mainstreaming, bringing together ECREEE, RAAF, PPDU, WRMC/CGRE, and the ECOWAS Gender Development Centre. This coordination mechanism, convened in September 2024 and reviewed in July 2025, fosters synergies across sectors and has produced joint roadmaps (2024–2025 and 2025–2026) to guide integrated regional actions

### 3. Governance and Institutional Frameworks

#### 3.1 Nexus Policy and Institutional Analysis

The WEFE Nexus in West Africa operates within a dense policy landscape of regional and national frameworks. However, sectoral policies remain largely unintegrated, with critical misalignments persisting. For instance, the WAPP Master Plan does not systematically incorporate water availability scenarios, and agricultural subsidies often create perverse incentives for inefficient water and energy use [30]. The concurrent revision of ECOWAP and WAWRP represents a critical window to embed Nexus criteria and cross-sectoral indicators [9][18]. Improved WEF Nexus governance is essential for attracting sustainable investment and achieving national targets for energy access, food security, and water availability [30].

### 3.2 Inclusive and Equitable Participation

Despite their central role in managing water, sanitation, food, and energy at household and community levels, women and youth remain significantly underrepresented in WEFE-related governance, planning, and investment processes in West Africa. Women and young people are key actors in water collection, sanitation management, food production and processing, and household energy use, yet they continue to face structural barriers in access to land, finance, skills, modern energy technologies, and decision-making platforms. These inequalities limit the effectiveness, sustainability, and equity of WEFE interventions, particularly in urban and peri-urban contexts where service deficits are most acute.

Recognizing these gaps, ECOWAS has taken important steps to strengthen inclusive participation. ECOWAS was the first African Regional Economic Community to adopt a Directive on Gender Assessment in Energy Projects, providing a regulatory basis for mainstreaming gender considerations into energy and related WEFE investments [31]. In November 2025, ECOWAS further validated a Gender Equality Framework for Women in Clean Energy, aimed at enhancing women's participation across clean energy value chains, leadership roles, and entrepreneurship [32].

Beyond policy frameworks, participatory and inclusive approaches are increasingly recognized as critical enablers of effective WEFE governance. Participatory modeling and co-design processes, such as initiatives piloted in Nigeria that actively engage local communities, women, and youth in designing integrated water-energy-food solutions, demonstrate strong potential for improving ownership, relevance, and implementation outcomes [33]. Strengthening gender-responsive and youth-inclusive participation mechanisms is therefore essential not only for social equity, but also for maximizing the developmental, economic, and environmental returns of WEFE-aligned policies and investments in West Africa.

### 3.3 Regulatory and Funding Frameworks

Recent regulatory advances include the adoption in June 2024 of a draft Directive on managing shared water resources in West Africa and a draft Directive on the development of hydraulic infrastructures [18]. Several funding mechanisms support Nexus-related activities, though they remain fragmented. Key instruments include the \$75 million EREEEF, which provides grants, loans, and guarantees for clean energy projects [34]; the \$225 million REAP, a World Bank-supported initiative to extend distribution networks in The Gambia, Guinea-Bissau, and Mali [35]; the West African Water Facility currently being established within EBID [18]; and the ECOWAS Fund for the Development and Financing of the Transport and Energy Sectors. Despite these mechanisms, substantial financing gaps persist: the ECOWAS Hydromet Initiative has an investment need of \$324.5 million [19], and the WAPP Master Plan requires \$36 billion [10].

## 4. Challenges and Opportunities

The diagnostic analysis of the WEFE Nexus in West Africa reveals a region with immense natural potential but constrained by a series of interlocking challenges. Addressing these challenges requires targeted interventions that leverage emerging opportunities for innovation, cooperation, and investment. This section synthesizes the key findings from the preceding analysis into a structured overview of barriers and levers for transformation.

## 4.1 Key Challenges

### 4.1.1 Governance and Coordination Challenges

Institutional fragmentation remains the most significant barrier to effective Nexus implementation. Sectoral ministries and agencies continue to operate in silos, with limited formal coordination mechanisms and data-sharing protocols. The PFCM/IWRM-WA (the primary regional coordination framework for water governance) met only once between 2015 and 2024, reflecting systemic institutional inertia [24]. The recent relocation of the WRMC from Burkina Faso to Guinea, while necessary, creates additional transitional challenges for regional water governance [25].

The withdrawal of Burkina Faso, Mali, and Niger from ECOWAS further complicates transboundary basin coordination, particularly in the Niger and Volta basins. These geopolitical shifts require new modalities for cooperation between ECOWAS institutions and basin organizations such as the Niger Basin Authority (NBA) and Volta Basin Authority (VBA). As Olawuyi (2022) notes, improved WEF Nexus governance is essential for attracting sustainable investment and achieving national targets for energy access, food security, and water availability [30].

### 4.1.2 Technical and Financial Constraints

The scale of investment required for WE4F-aligned transformation far exceeds current financing levels. Regional energy, water, and agricultural infrastructure needs are substantial, while public budgets and concessional resources remain limited. As a result, many priority investments in irrigation, hydropower, climate services, and ecosystem restoration remain underfunded.

From a technical perspective, the region faces low energy access, underexploited renewable resources, and infrastructure gaps. Hydropower potential remains largely untapped, rural electrification rates are extremely low, and energy systems are dominated by thermal generation, increasing exposure to fuel price volatility and climate risks. These constraints directly affect agricultural productivity, water services, and food value chains.

### 4.1.3 Knowledge and Skills Gaps

Effective implementation of the Water–Energy–Food (WE4F/WEFE) Nexus in West Africa is constrained by insufficient data, weak analytical capacity, and limited human skills. Hydrometeorological services remain underdeveloped, with gaps in observation networks, forecasting systems, and data management. These limitations undermine climate risk management, irrigation planning, energy system resilience, and evidence-based policy design.

In addition, although WE4F concepts are well established in academic research, there is a persistent disconnect between research and practice. Knowledge generated by universities and research institutions is rarely translated into operational tools or scalable solutions for farmers, utilities, and decision-makers. Capacity gaps within regional and national institutions further limit the ability to operationalize integrated Nexus approaches.

## 4.2 Strategic Opportunities

### Policy and Institutional Reform Windows

West Africa currently benefits from a unique policy alignment opportunity, with the revision of key regional strategies in agriculture, water, and energy. This creates an opening systematically integrating WE4F principles, joint indicators, and cross-sector investment criteria into regional and national policies.

Strengthening coordination among ECOWAS institutions and specialized agencies can significantly improve policy coherence and implementation efficiency.

### **Expanding Financing Instruments and Regional Funds**

New and emerging regional financing mechanisms provide important opportunities to close the WE4F investment gap. Dedicated funds for water, energy, and transport, along with partnerships between regional development banks and international financiers, can be leveraged to support Nexus-aligned infrastructure and innovation. These instruments also create pathways to mobilize blended finance, combining public, private, and climate funds on a large scale.

### **Technological Innovation and Digital Transformation**

Technological advances offer strong leverage for WE4F transformation. Solar-powered irrigation, agrivoltaic systems, energy-efficient agro-processing, and digital decision-support tools can simultaneously increase agricultural productivity, reduce water and energy use, and enhance resilience to climate shocks. When combined with smart monitoring and governance mechanisms, these technologies help avoid unintended trade-offs, such as groundwater over-abstraction.

### **Participatory and Inclusive Approaches**

Participatory approaches (such as collaborative modeling, farmer-centered innovation, and community-based resource management) enhance ownership, adoption, and sustainability of WE4F solutions. Integrating gender and youth perspectives into innovation design and implementation further increases socio-economic impact and ensures that benefits reach vulnerable groups.

### **Growing Climate Finance and Regional Initiatives**

The expansion of climate finance, including projects approved or under preparation with international climate funds, create favorable conditions for scaling integrated WE4F solutions. By aligning WE4F initiatives with climate adaptation, mitigation, and resilience objectives, the region can access new funding streams while delivering multiple development co-benefits.

## **5. Strategic Recommendations**

West Africa has sufficient natural water, energy, and agricultural resources to achieve food and energy security. The main constraints are fragmented governance, underfinancing of integrated infrastructure, weak climate and water information systems, and limited translation of innovation into scale. The following recommendations focus on systemic enablers rather than isolated projects.

### **5.1 Policies and Governance**

- Federate and strengthen existing regional coordination mechanisms across ECOWAS, WAEMU, and CILSS to promote policy coherence and structured intersectoral trade-off management under a WEFE Nexus framework.
- Encourage Member States and regional institutions to progressively integrate WEFE inter-sectoral criteria and indicators into policy design and review processes, in order to support more coherent, resilient, and integrated development planning
- Strengthen and consolidate the role of PPDU as the regional hub for preparing WEFE projects, responsible for structuring, and making integrated investments bankable in coordination with technical agencies.

## 5.2 Financing and Investment

- Dedicate WEFE Nexus financing windows within existing regional funds (EBID, ECOWAS Transport and Energy Fund, etc...) to derisk and cofinance projects that deliver measurable benefits across water, energy, and food security.
- Encourage the development of a Regional WE4F Nexus Investment Framework, led by the PPDU, to identify priority investments, develop a pipeline of bankable projects, and align public, donor, and private financing
- Promote the systematic use of blended and climate finance instruments to de-risk and scale WE4F investments and crowd in private-sector participation;
- Encourage Member States to mainstream WE4F into national budgeting and investment plans, including National Public Investment Programs (PIPs), sectoral investment strategies and Nationally Determined Contributions (NDCs)

## 5.3 Capacity Building and Knowledge Management

- Accelerate and strengthen the implementation of the ECOWAS Hydromet Initiative, in order to deliver reliable climate, water, and weather services that can effectively underpin WEFE-informed planning and decision-making.
- Build applied WEFE analytical capacity among policymakers, technicians, and project developers through targeted regional training programs.
- Scale up the Regional Certification for Sustainable Energy Skills to include WEFE-related sustainable energy occupations, as a means to promote harmonized quality standards across Nexus sectors in West Africa.
- Leverage and better connect existing sectoral and regional knowledge platforms to facilitate WEFE-relevant data sharing, dissemination of tools and best practices, and peer learning across West Africa

## 5.4 Research and Technology Innovation

- Orient applied research toward demand-driven, operational WEFE solutions co-developed by research institutions, innovation hubs, and public decision-makers.
- Scale up proven WEFE technologies by accelerating deployment of mature solutions such as solar irrigation, climate services, green agro-processing, and circular economy technologies.
- Expand the use of digital tools, climate and hydrological data, remote sensing, and decision-support systems to enable integrated WEFE planning and decision-making.
- strengthening public-private-research partnerships to accelerate the scaling of WEFE innovations, with particular support to SMEs and startups.

## 6. Conclusion

This diagnostic confirms that West Africa has sufficient water, energy, agricultural, and environmental resources to meet its development objectives, but remains constrained by fragmented governance, limited coordination across sectors, and underinvestment in integrated solutions. The challenge is therefore not resource scarcity, but the effective organization, financing, and governance of interdependent systems.

The Water-Energy-Food-Environment (WEFE) Nexus provides a practical framework to address these constraints by guiding policies and investments toward solutions that generate multiple benefits, reduce trade-offs, and strengthen climate resilience. Ongoing policy reforms, emerging regional financing

mechanisms, growing private-sector engagement, and proven technologies offer a timely opportunity to operationalize the Nexus at scale.

The West Africa Regional Water Forum (FREAO) represents a critical platform to move from diagnosis to action. By fostering political commitment, aligning institutions and financing instruments, and supporting bankable WEFE project pipelines, FREAO can anchor the WEFE Nexus as a cornerstone of regional integration, resilience, and inclusive growth in West Africa.

## 7. Proposed Panel Discussion

### **Session 1 Title**

Operationalizing the Water–Energy–Food–Environment (WEFE) Nexus in West Africa – Governance, Financing, Applied Innovation and High-Impact Private-Sector Solutions

### **Session Description**

This technical session provides a platform for experience-sharing and technical dialogue on the operationalization of the WEFE Nexus in West Africa. It brings together key stakeholders to explore governance, financing, innovation, and private-sector solutions that enable integrated implementation.

The session aims to highlight practical lessons, financing and coordination approaches, and scalable WEFE business models, contributing to strengthened alignment and investment readiness across Nexus interventions

### **Session Moderator**

ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)

### **Session Objectives**

- Promote a shared understanding of the governance, financing, and coordination conditions that enable effective operationalization of the WEFE Nexus in West Africa.
- Facilitate the exchange of practical experiences and lessons learned on integrated WEFE implementation, including private-sector engagement, applied innovation, and partnership approaches.
- Strengthen alignment among regional institutions, development partners, and stakeholders around coherent and investment-ready WEFE interventions

### **Session Outcomes**

- improved understanding of governance, coordination, and financing approaches that support integrated and scalable WEFE implementation.
- Identification of practical orientations to enhance project bankability, private-sector participation, and the articulation between research, innovation, and capacity development.
- Consolidated technical insights and shared experiences to inform regional processes
- Technical inputs to inform the FREA WEFE roadmap.

### **Session Agenda**

| Duration | Session                                      | Speakers/Panelists |
|----------|----------------------------------------------|--------------------|
| 5 min    | Opening and technical framing of the session | ECREEE (Moderator) |
| 10 min   | WEFE policies and governance                 | RAAF/ECOWAS        |

|        |                                            |                  |
|--------|--------------------------------------------|------------------|
| 10 min | Financing and private-sector investment    | AfDB             |
| 10 min | Role of Technical and Financial Partners   | AECID            |
| 10 min | Private-sector WEFE solution               | Private Promoter |
| 40 min | Interactive Debate and Audience Engagement | All              |
| 5 min  | Synthesis and conclusions                  | ECREEE           |

### **Key Guiding Questions for the Session**

- What concrete coordination mechanisms are most effective in translating WEFE policies into operational actions at national level?
- How can regional governance frameworks better incentivize cross-sector collaboration among member states?
- Which financing instruments have proven most successful in reducing risk for private investors in WEFE projects?
- How can blended finance be scaled to improve bankability of integrated WEFE investments?
- How can development partners better align their interventions to avoid fragmentation in WEFE initiatives?
- What coordination models have delivered the highest impact in regional WEFE programs?
- What are capacity development gaps that limit WEFE operationalization in West Africa?
- What are the main barriers private companies face when scaling WEFE business models?
- Which policy or financial incentives would most accelerate private-sector participation?

### **Key Messages**

- Effective WEFE operationalization requires strong political leadership and structured cross-sector governance mechanisms.
- Blended and innovative financing instruments are essential to de-risk WEFE investments and crowd in private capital.
- Alignment between technical partners, research institutions, and implementing agencies is critical for scalable impact.
- Private-sector engagement thrives when projects are bankable, regulatory frameworks are clear, and capacities are reinforced.

## Session 2 Title

Transforming the Sahel through Water, Youth and Entrepreneurial Innovation: Towards an Innovative Two-Way Strategic Partnership with India

### **Session Description**

The Sahel faces interconnected challenges related to water security, youth unemployment, climate change, rural livelihoods, and economic resilience. At the same time, the region possesses a dynamic youth population capable of driving transformative solutions through innovation, entrepreneurship, and technology.

This session explores how strategic partnerships between West Africa and India can accelerate sustainable development through water-centered innovations, youth-led entrepreneurship, skills transfer, and knowledge exchange. It will showcase experiences from youth organizations, policy networks, academic institutions, and innovation platforms that are contributing to resilient livelihoods, water security, job creation, and sustainable resource management.

The discussion will also identify opportunities for establishing a two-way partnership framework that facilitates mutual learning, investment, technology transfer, capacity development, and co-creation of innovative solutions adapted to Sahelian realities.

### **Session Moderator**

International Water Management Institute (IWMI)

### **Session Objectives**

- Promote dialogue on the role of youth, water innovation, and entrepreneurship as drivers of sustainable development and resilience in the Sahel.
- Showcase successful youth-led initiatives and institutional approaches that strengthen water governance, job creation, and climate adaptation.
- Explore opportunities for enhanced cooperation and knowledge exchange between West African and Indian youth, research institutions, and innovation ecosystems.
- Identify strategic actions to strengthen youth participation in policy processes and investment opportunities within the water-energy-food-environment nexus.
- Contribute recommendations for a long-term Africa–India partnership supporting innovation-driven development in the Sahel.

### **Session Outcomes**

- Improved understanding of the contribution of youth-led innovation and entrepreneurship to water security and sustainable development in the Sahel.
- Identification of practical opportunities for cooperation between West African and Indian institutions, entrepreneurs, and youth networks.
- Enhanced dialogue between policymakers, researchers, innovators, and youth organizations on scaling innovative solutions.

- Consolidated recommendations to support youth engagement, innovation financing, and partnership development.
- Technical inputs and strategic recommendations to inform regional dialogue on youth, water security, and innovation in the Sahel.

### Session Agenda

| Duration | Session                                                                                                       | Speakers/Panelists                                                 |
|----------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 5 min    | Opening and technical framing of the session                                                                  | IWMI, (Moderator)                                                  |
| 10 min   | Empowering Youth for Water Security and Climate Resilience in the Sahel: Experiences of Young Water Champions | Young Water Champions for the Sahel (JCES)                         |
| 10 min   | Strengthening Youth Participation in Water Governance and Policy-Making                                       | West African Network of Young Parliamentarians for Water (ROAPJE), |
| 10 min   | Innovation, Entrepreneurship and South-South Cooperation: Lessons from India                                  | Young Indian Professionals,                                        |
| 10 min   | Building Innovation Ecosystems for Youth Employment and Water Management in the Sahel                         | 2IE                                                                |
| 40 min   | Interactive Debate and Audience Engagement                                                                    | All                                                                |
| 5 min    | Synthesis and conclusions                                                                                     | IWMI                                                               |

### Key Guiding Questions

- How can young entrepreneurs contribute to solving water, climate, and livelihood challenges in the Sahel?
- What policy and institutional reforms are needed to increase youth participation in water governance and development planning?
- Which innovations from India could be adapted and scaled in Sahelian countries?
- How can South-South cooperation strengthen youth entrepreneurship and technology transfer between West Africa and India?
- What financing mechanisms are most effective in supporting youth-led start-ups and innovation initiatives?
- How can universities, research institutions, and innovation hubs better support youth entrepreneurship and job creation?
- What barriers currently prevent scaling of youth-led innovations in water management and climate resilience?
- How can regional organizations facilitate stronger partnerships among governments, youth networks, investors, and development partners?

### Key Messages

- Youth are essential actors for achieving water security, climate resilience, and sustainable economic transformation in the Sahel.

- Entrepreneurship and innovation provide practical pathways for addressing unemployment while strengthening resilience to climate and environmental challenges.
- Strong partnerships among governments, academia, private sector actors, and youth organizations are necessary to scale innovative solutions.
- South–South cooperation between West Africa and India offers significant opportunities for technology transfer, capacity development, and investment.
- Enabling policies, access to finance, mentoring, and innovation ecosystems are critical for fostering successful youth-led enterprises.
- Sustainable transformation of the Sahel requires placing young innovators and entrepreneurs at the center of development strategies.

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## Appendices

### Appendix A: Stakeholder Mapping

The WEFE Nexus governance landscape in West Africa involves a diverse array of actors operating at regional, basin, national, and local levels. The following mapping provides an overview of key institutions and their roles.

#### Regional Organizations

| Institution              | Mandate Relevant to WEFE Nexus                                                                                                                |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ECOWAS Commission</b> | Overall political leadership; sectoral departments for Infrastructure/Energy, Economic Affairs/Agriculture, and Environment/Natural Resources |
| <b>WAEMU/WAEMU</b>       | Economic integration policies with implications for resource management and regional infrastructure financing                                 |
| <b>CILSS</b>             | Drought control and food security in the Sahel; operates the AGRHYMET regional centre                                                         |

#### ECOWAS Specialized Agencies

| Agency                                          | Mandate Relevant to WEFE Nexus                                                                                |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>WRMC</b> (Water Resources Management Centre) | Coordination of IWRM implementation; serves as secretariat for PFCM; currently relocating to Guinea           |
| <b>ECREEE</b>                                   | Promotion of renewable energy and energy efficiency; leads Nexus Energy Water Food & Circular Economy program |
| <b>WAPP</b>                                     | Regional electricity generation and transmission coordination; implements WAPP Master Plan                    |
| <b>RAAF/RAAF</b>                                | Implementation of ECOWAP; agricultural modernization and food security                                        |
| <b>EBID</b>                                     | Regional development finance; hosting the West African Water Facility                                         |
| <b>PPDU</b>                                     | Prepares bankable regional infrastructure projects across transport, energy, water, and ICT sectors           |
| <b>EGDC</b>                                     | Gender mainstreaming across ECOWAS policies and programs; supports women's economic empowerment               |

#### Transboundary Basin Organizations

| Basin Organization                 | Shared Basin  | Member States                                                                                                            |
|------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>NBA</b> (Niger Basin Authority) | Niger River   | 9 countries including Benin, Côte d'Ivoire, Guinea, Nigeria (plus non-ECOWAS: Burkina Faso, Mali, Niger, Cameroon, Chad) |
| <b>VBA</b> (Volta Basin Authority) | Volta River   | 6 countries including Benin, Côte d'Ivoire, Ghana, Togo (plus non-ECOWAS : Burkina Faso, Mali)                           |
| <b>OMVS</b>                        | Senegal River | Senegal, Mali, Mauritania, Guinea                                                                                        |
| <b>OMVG</b>                        | Gambia River  | The Gambia, Guinea, Guinea-Bissau, Senegal                                                                               |
| <b>MBA</b> (Mono Basin Authority)  | Mono River    | Benin, Togo                                                                                                              |
| <b>MRU</b> (Mano River Union)      | Mano River    | Côte d'Ivoire, Guinea, Liberia, Sierra Leone                                                                             |

#### Development Partners and International Organizations

| Institution                            | Role in WEF Nexus                                                                                                       |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>World Bank</b>                      | Financing for DREVE, REAP, Hydromet Initiative; technical assistance                                                    |
| <b>AECID</b>                           | Financing for ECREEE clean energy circular economy and solar food security projects across seven West African countries |
| <b>ADA</b>                             | Financing for ECREEE circular economy scoping project in Côte d'Ivoire, Ghana, Liberia, Togo                            |
| <b>African Development Bank (AfDB)</b> | Infrastructure financing; Desert to Power initiative                                                                    |
| <b>FAO</b>                             | Food security assessments; agricultural water management                                                                |
| <b>WMO</b>                             | Climate and hydrological data standards; State of the Climate reporting                                                 |
| <b>GWP-WA</b>                          | IWRM promotion; PFCM revitalization support                                                                             |
| <b>IUCN</b>                            | Transboundary water governance; RIWEMono project implementation                                                         |
| <b>IWMI</b>                            | Research and capacity building; five year agreement with ECOWAS on transboundary water governance                       |
| <b>GIZ</b>                             | Nexus technical assistance; support to ECREEE and FREXUS project                                                        |
| <b>Sida</b>                            | Forest and land management financing                                                                                    |
| <b>WE4F</b>                            | Scaling innovations at the water energy food nexus                                                                      |

#### Research and Academic Institutions

| Institution                                      | Role in WEF Nexus                                                                             |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>WASCAL</b>                                    | Climate change and land use research; conducted ECOWAS agricultural productivity study (2024) |
| <b>AGRHYMET</b>                                  | Climate, water, and food security monitoring; early warning systems for the Sahel             |
| <b>Ahmadu Bello University (Nigeria)</b>         | Participatory modeling research; WEF Nexus governance studies                                 |
| <b>Université Joseph Ki-Zerbo (Burkina Faso)</b> | Bagré Dam Nexus modeling                                                                      |
| <b>Abdou Moumouni University (Niger)</b>         | Agrivoltaics research                                                                         |

## Appendix B: Key Data and Indicators

The following table consolidates key quantitative indicators referenced throughout this diagnostic report. All figures are from the most recent authoritative sources as of 2024–2026.

| Indicator                                     | Value          | Source                        | Year         |
|-----------------------------------------------|----------------|-------------------------------|--------------|
| <b>Demographics</b>                           |                |                               |              |
| ECOWAS Member States                          | 12             | ECOWAS                        | 2025         |
| West Africa regional population               | 466.53 million | UN Population Division        | 2025         |
| Annual population growth rate                 | 2.25%          | UN Population Division        | 2024–2025    |
| Urban population share                        | 72.42%         | UN Population Division        | 2024         |
| <b>Energy</b>                                 |                |                               |              |
| Installed electricity capacity                | 25,140 MW      | ECOWAS Key Energy Facts       | 2023         |
| Thermal generation share                      | 76%            | ECOWAS Key Energy Facts       | 2023         |
| Hydropower share                              | 22%            | ECOWAS Key Energy Facts       | 2023         |
| Solar/wind share                              | 2%             | ECOWAS Key Energy Facts       | 2023         |
| Household electricity access rate             | 57.7%          | ECOWAS Key Energy Facts       | 2023         |
| Rural electricity access rate                 | 10%            | ECOWAS Commissioner Statement | March 2024   |
| Per capita electricity consumption            | 262.7 kWh      | ECOWAS Key Energy Facts       | 2023         |
| Total primary energy supply                   | 175,700 ktoe   | ECOWAS Key Energy Facts       | 2023         |
| Hydropower potential (estimated)              | 26 GW          | ECOWAS Commissioner Statement | March 2024   |
| Hydropower utilization rate                   | 20%            | ECOWAS Commissioner Statement | March 2024   |
| Solar/wind electricity production             | 1,853 GWh      | ECOWAS Key Energy Facts       | 2023         |
| Solar/wind annual growth (2019–2023)          | 29.7%          | ECOWAS Key Energy Facts       | 2023         |
| <b>Food Security</b>                          |                |                               |              |
| People in acute food crisis (current)         | 34.7 million   | Cadre Harmonisé               | Dec 2024     |
| People projected in food crisis (lean season) | 47 million     | ECOWAS                        | Jun–Aug 2025 |
| Food insecure population share                | 12%            | FAO                           | 2024         |
| Acute malnutrition rate                       | 10–14%         | ECOWAS                        | 2024         |
| Regional Food Reserve stockpile               | 74,000+ tons   | ECOWAS                        | 2024         |
| <b>Climate and Environment</b>                |                |                               |              |
| Temperature rise (above pre-industrial)       | 1.2°C          | WMO                           | 2024         |
| Flood incident increase (2021–2024)           | 47%            | ECOWARN                       | 2024         |
| Flood-affected population                     | 5+ million     | ECOWARN                       | 2021–2024    |
| Flood damage                                  | \$1.3 billion  | ECOWARN                       | 2021–2024    |
| Agricultural productivity reduction           | 10%            | WASCAL/ECOWAS                 | 2024         |
| <b>Investment Needs</b>                       |                |                               |              |
| WAPP Master Plan investment                   | \$36 billion   | ECOWAS                        | 2019–2033    |

|                                               |                         |                               |            |
|-----------------------------------------------|-------------------------|-------------------------------|------------|
| Hydromet Initiative investment need           | \$324.5 million         | ECOWAS                        | 2021       |
| ECOWAS Fund for Transport and Energy (annual) | \$350+ million          | ECOWAS Commissioner Statement | March 2024 |
| EBID-EIB climate partnership                  | €100 million            | EBID/EIB                      | 2025       |
| <b>Green Hydrogen</b>                         |                         |                               |            |
| Production target 2030                        | 0.5 million tonnes/year | ECOWAS                        | 2023       |
| Production target 2050                        | 10 million tonnes/year  | ECOWAS                        | 2023       |